NOTICE

All drawings located at the end of the document.

ER/WM&I DDT

Source/Driver: (Name & Number from ISP, IAG milestone, Mgmt Action, Corres Control, etc)	**Closure #·** (Outgoing Correspondence Control #, if applicable)	9/3/97 **Due Date**

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Document Subject:

TRANSMITTAL OF THE DRAFT SAMPLING AND ANALYSIS PLAN FOR THE PRE-REMEDIAL INVESTIGATION OF IHSS 118 1, REV 0 - AMT-099-97

KH-00003NS1A September 29, 1997

Discussion and/or Comments.

Please find attached the Draft Sampling and Analysis Plan for the Pre-Remedial Investigation of IHSS 118 1 It is requested that the Department of Energy and Kaiser-Hill review the document concurrently in order to expedite field activities Due to the expedited schedule, it is requested that comments be returned by close of business on Wednesday, September 3, 1997 or earlier

There are five copies of the document accompaning this transmittal letter The distribution of the document is as follows

- Two copies for the Kaiser-Hill project manager, Ann K Sieben,
- Two copies for the transmittal to the Department of Energy Rocky Flats Field Office,
- One copy for correspondence control

Please feel free to contact Annette Primrose at extension 4385 or Craig Cowdery at extension 2055 of my staff if there are any questions or additional copies are needed

Attachments
As Stated

cc
M C Broussard
C Cowdery
A L Primrose
A M Tyson
RMRS Records (2)

RF/RMRS-97-059

Draft Sampling And Analysis Plan for the Pre-Remedial Investigation of IHSS 118.1

August 20, 1997

Revision: Draft

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1 0 INTRODUCTION

The purpose of thıs Samplıng and Analysıs Plan (SAP) ıs to dırect the collectıon of field data to ıdentıfy and delıneate the extent of the volatıle organıc compound (VOC) free product ın the subsurface derıved from Indıvıdual Hazardous Substance Sıte (IHSS) 118 1 - Multıple Solvent Spılls West of Buıldıng 730 Thıs data wıll provıde ınput for the desıgn of a collectıon system to capture and remove the subsurface free product While thıs actıon wıll not constıtute a complete source removal, ıt wıll remove much of the free product whıch ıs belıeved to be contrıbutıng to a plume of VOC contamınatıon ın groundwater ın thıs area The actıon wıll partıally remedıate the source area ranked 8th on the Envıronmental Restoratıon (ER) Rankıng and wıll support remedıatıon of the assocıated groundwater plume ranked 19th [Attachment 4 to the Rocky Flats Cleanup Agreement (RFCA) (DOE 1996a)] Removal of the source materıal ıs consıstent wıth the Rocky Flats Envıronmental Technology Sıte (RFETS) strategy for groundwater whıch ıs to prevent contamınatıon of surface water by removal of contamınant sources

The objectıve of the SAP ıs to descrıbe the specıfic data needs, samplıng and analysıs requırements, data handlıng procedures, and assocıated Quality Assurance/Qualıty Control (QA/QC) requırements for thıs project All work wıll be performed ın accordance wıth the RMRS Qualıty Assurance Program Descrıptıon (QAPD) (RMRS 1997) The SAP summarızes the exıstıng data and descrıbes the scope of work requıred to define the nature and extent of contamınatıon ın the subsurface at the IHSS 118 1 sıte sufficıently to desıgn a collectıon system

1 1 Background

IHSS 118 1 ıs an area of known subsurface soıl contamınatıon resultıng from leaks and spılls assocıated wıth an underground storage tank containıng carbon tetrachlorıde Thıs IHSS ıs located due north of Buıldıng 776 and near Buıldıng 730, ın a hıghly developed area of the RFETS Industrıal Area (Fıgure 1)

Surficıal materıals ın the IHSS 118 1 area are predomınantly artıficıal fill, composed mostly of reworked Rocky Flats Alluvıum, along wıth some remaınıng undısturbed Rocky Flats Alluvıum

The fill and undisturbed alluvium are primarily composed of clay with interspersed unconsolidated gravels and sands Immediately underlying the surficial material is the weathered claystone bedrock of the Arapahoe Formation

There are numerous underground and overhead utilities and structures in the IHSS 118 1 area These include vitreous clay sanitary sewer lines, electrical lines, tunnels between buildings, process waste lines and process waste tanks Information from excavations in other areas and conversations with workers indicate that most of the buried utilities were backfilled using previously excavated native materials

The contamination in the IHSS 118 1 area is primarily related to an underground storage tank which was installed prior to 1970 (Figure 1) This 5,000 gallon capacity steel tank was used to store carbon tetrachloride, and was surrounded by a concrete containment structure Numerous surface spills occurred before 1970, some up to 200 gallons The inlet to the tank failed in June 1981 and released [illegible] carbon tetrachloride into the containment structure Carbon tetrachloride was pumped out of the containment structure onto the surrounding soil ground surface, and the tank was removed along with a limited amount of soil around the tank It is assumed that the surrounding concrete containment structure was removed at this time, but this has not been verified (DOE 1992)

Immediately east and partially overlapping IHSS 118 1 is a group of four process waste tanks referred to as tank groups T-9 and T-10 which were part of the old process waste system Tank T-9 consists of two 22,500 gallon concrete underground storage tanks T-10 consists of two 4,500 gallon concrete underground tanks Both sets of tanks were installed in 1955 but are no longer used as process waste tanks T-9 is currently being utilized as plenum deluge catch tanks for Building 776 No releases from either set of tanks has been documented (DOE 1995) IHSSs 121-Tank 9, 121-Tank 10, 131, and 144[N] were closed as part of the Underground Storage Tank accelerated action in 1996 (RMRS 1996a)

1 2 Prior Investigations

The OU 9 Phase I Remedial Investigation found free-phase carbon tetrachloride in the subsurface soil and groundwater in the vicinity of IHSS 118 1 Soil borings were drilled near the four corners of

Tanks T-9 and T-10, and all four borings intercepted free-phase carbon tetrachloride (Figure 1) (DOE 1995) When a water sample was collected from one of the borings, the liquid separated into two distinct liquid phases Other VOCs might be present, but could be masked by the high concentrations of carbon tetrachloride

1 3 Contamination Data Summary

Carbon tetrachloride is a dense nonaqueous phase liquid (DNAPL) Because it has a higher specific gravity than water, free-phase carbon tetrachloride will form a distinctive layer at the base of an aquifer at the lowest depth possible Since permeability controls the vertical migration of carbon tetrachloride, carbon tetrachloride tends to collect at low points in the upper surface of impermeable structures Therefore, the bedrock surface, building footing drains, and subsurface structures probably control the extent of the free-product plume as well as much of the dissolved phase portion of the contaminated groundwater plume

1 3 1 Groundwater Contamination

Groundwater flow in this area is to the northeast towards Buildings 771 and 774 Portions of these buildings are constructed 20 to 30 feet below grade and have footing drains Buildings 701 and 730 are not believed to have subsurface structures Carbon tetrachloride and other VOCs have been detected in the groundwater from nearby wells indicating that a dissolved phase plume is moving with groundwater This contaminated groundwater plume may eventually reach the North Walnut Creek drainage, especially after the removal of the surrounding buildings (RMRS 1996)

Downgradient well P210189, due east of IHSS 118 1 at the western edge of the Solar Ponds, was completed in the Arapahoe No 1 Sandstone Groundwater in this well contains carbon tetrachloride concentrations up to 21,000 ug/l and trichloroethene up to 8,000 ug/l together with other VOCs The IHSS 118 1 carbon tetrachloride spill is believed to be the source of this contamination indicating that the dissolved phase of the groundwater plume has migrated in an eastward direction

Table 1 Maximum Downgradient Groundwater Concentrations

Contaminant	P210189	P209289	Well 2286
Carbon Tetrachloride	21,000 ug/l	1,300 ug/l	3,000 ug/l
Trichloroethene	8,600 ug/l	ND*	6,000 ug/l

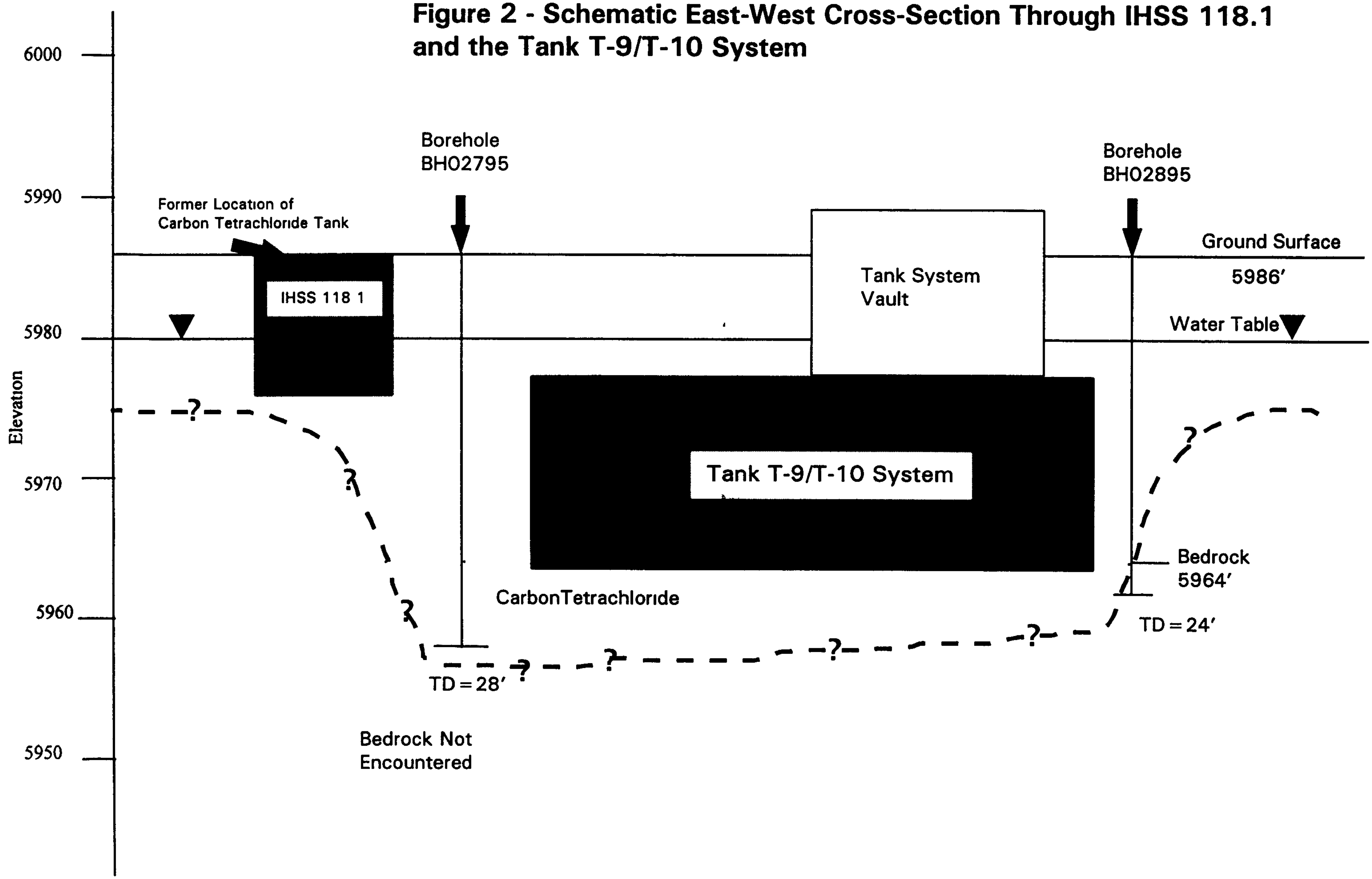
Note all values are maximum observed concentrations, regardless of date collected
* ND = Not detected at the detection limit of 12 ug/l

1 3 2 Extent of Free-Phase Contamination

The low permeability claystone bedrock limits the vertical migration of the carbon tetrachloride, and the relief on the bedrock surface controls the extent of the free-phase plume Available data indicates that the top of bedrock surface prior to construction of Building 771 sloped to the northeast away from IHSS 118 1, and was approximately 10 to 15 feet below ground surface Excavation during construction of this building apparently altered this surface, since recent field investigations encountered the claystone surface 10 feet or more below the depth expected Excavation may have either increased the slope of the bedrock surface or created a depression in the bedrock next to the building Installation of the carbon tetrachloride tank and the Tank T-9/T-10 system probably also created localized depressions in the bedrock surface The east-west cross section for this area (Figure 2) shows the relative position of these tanks, and the expected bedrock surface

The extent of free-phase carbon tetrachloride cannot be accurately determined because the bedrock surface is poorly defined and it is not known how much solvent was released into the area However, the carbon tetrachloride released from surface spills and leakage from the underground storage tank is expected to have migrated downward towards the bedrock surface and most likely collected in depressions in the bedrock surface in the spill area and/or within the closed bedrock depression from the excavation of Tanks T-9 and T-10 If sufficient carbon tetrachloride was released to fill up this bedrock depression, any additional carbon tetrachloride would be expected to flow towards Buildings 771 and 774 along the bedrock surface created during construction of these buildings Lateral movement of the carbon tetrachloride to the north is expected to be controlled by the south walls of the buildings, and the contaminant might be slowly removed by seepage into these buildings' footing

Figure 2 - Schematic East-West Cross-Section Through IHSS 118.1 and the Tank T-9/T-10 System



drain systems It is not possible at this time to confirm whether this is a migration path from IHSS 118 1 due to the potential presence of carbon tetrachloride from other source areas

There is a potential for the carbon tetrachloride to migrate along the numerous underground utility corridors in this area The most likely utility pathway is a process waste line leaving the Tank System and running eastwards at a depth of 6 to 8 feet In addition, a vitreous clay sanitary sewer line is found 20 feet north of the carbon tetrachloride spill also at a depth of 6 to 8 feet below surface The slope of neither line is known, however, the process waste line must slope to the east as it leaves the tanks, and the sewer line should slope eastward towards the Sewage Treatment Plant While the utilities in this area are possible conduits for eastward transport of the dissolved phase of the groundwater plume, free phase carbon tetrachloride is probably not currently migrating along these pathways This is substantiated by the decreasing contaminant concentrations in the groundwater to the east at well P210189 near the Solar Ponds (Figure 1)

2 0 PROJECT AND DATA QUALITY OBJECTIVES

The objective of this SAP is to identify the extent of the free-phase, carbon tetrachloride plume sufficiently for installation of collection wells Data requirements to support this project were developed using criteria established in *Guidance for the Data Quality Objective Process*, EPA QA/G-4 (EPA 1994) The data gaps, study boundaries, and decisions are described below

The pre-remedial investigation has the following objectives

- Determine the extent of the free-phase carbon tetrachloride plume,
- Define the bedrock surface in the area to determine the shape of the prior excavation, and
- Determine the locations for collection wells for removal of free product

Previous investigations found free product around the process waste tanks This pre-remedial investigation will define the extent of free- phase carbon tetrachloride by installing an estimated 10 geoprobe holes in the vicinity of the process waste tanks The placement of the geoprobe holes was based on where data gaps existed and accessibility Eight geoprobe holes will initially be pushed within the estimated area of excavation around the process waste tanks, the area near the former carbon tetrachloride tank, and downgradient (north and east) of the excavation Some of these holes might have to be offset due to utilities or other factors that limit accessibility If visible staining, free liquid, or high levels of VOCs are detected using a field photoioniztion detector/flame ionization detector (PID/FID), temporary wells will be installed to allow for additional evaluation of the free product If free product is encountered, additional geoprobe holes will be pushed on a ten foot spacing out from the hole containing free product to further define the extent of the contamination It is estimated that two additional geoprobe holes will be needed, however, the actual number is dependent on the site conditions encountered and could be higher or lower

Both subsurface soil samples and liquid samples will be collected if possible Subsurface soil samples will be collected using Geoprobe push-type hydraulic equipment Table 2 lists the projected number of samples to be collected, analyses, and sampling requirements Sample containers will be provided by the Analytical Projects Office (APO)

Table 2 Analytical Sampling Requirements

Analysis Method	Number of Samples	Number of QC Samples	Total Number Samples	Containers, Preservatives, Holding Times
Soils SW846 Method 8260A	10	1 duplicate		60 ml wide mouth, Teflon lined, glass jar, 4° C, 14 days
Alpha Spectroscopy for Uranium, Plutonium 239/240 and Americium 241	10	1 duplicate	22	250 ml glass jar, NA, 6 months
Free Product/Groundwater SW846 Method 8260A	10	1 duplicate 1 rinsate 5 trip blanks (1 per shipment)	17	Three 40 ml Teflon lined VOA vials per sample with septum lids, HCl* to pH < 2 and 4° C, 14 days

* Note- For safety reasons, if there is any reason to believe the sample contains free-phase solvent, acid will not be put in the sample jars Furthermore, any from of contact between the sample and any form of acid will be avoided

Core samples will be recovered continuously in two to five-foot increments and evaluated by a geologist familiar with the local stratigraphy The geologist will determine the depth to bedrock The geoprobe locations will be surveyed using Global Positioning System (GPS) equipment or other appropriate survey equipment so that data can be properly plotted

Soil samples will be collected from the recovered soil cores and analyzed for a variety of contaminants to support the proper disposition of the soil removed during subsequent remediation activities At locations where free product is suspected, temporary wells will be installed and samples will be collected if possible Soil and liquid samples will be analyzed for VOCs and radionuclides as shown in Table 2

3 0 SAMPLING AND ANALYSES

Data will be collected to determine the appropriate site for the free product collection system Ten geoprobe holes will be located within the area of suspected free product to determine the extent of free product, and identify depth to bedrock This data will be combined with other available data to determine the location of the free product collection wells

Figure 1 shows the approximate location of the geoprobe holes If locations need to be changed to avoid obstructions, these changes will be noted in the field logbook The sampling requirements for each type of sample event to be performed under this SAP are described in Table 2 and in the following sections

Samples will be handled in accordance with FO 10 Receiving, Labeling, and Handling Environmental Material Containers, and FO 13 Containerization, Preserving, Handling and Shipping of Soil and Water Samples All samples will have an identification number generated by the RFETS APO If conditions are encountered in the field which make the use of a procedure unsafe or inappropriate for the task at hand, the specified procedures may be modified or replaced as long as the modification or replacement procedure is justified and modified in accordance to Procedure DC-06 01 Document Control Program

3 1 Field Preparation

Before data collection begins, each geoprobe location will be established using tape and compass, and marked with a reference stakes or flags with the unique number for that location Locations will be cleared in accordance with Procedure GT 10 Borehole Clearance The geoprobe location number will be obtained from the Water Database and correlated with sample analyses for that location These locations will be surveyed for location and elevation using GPS receivers operated in accordance with the equipment manuals (Ashtech 1993), or other appropriate survey equipment

3 2 Geoprobe Samples

All geoprobe boreholes will be advanced to a depth of two feet into weathered bedrock, or to a sufficient depth to confirm unweathered bedrock, a total depth expected not to exceed 20 feet If refusal occurs prior to reaching bedrock, up to two offsets will be pushed to try and reach the sampling objectives Geoprobe operations will be conducted as per GT 39 Push Subsurface Soil Sample

Core samples will be collected continuously in two to five foot increments from the surface to approximately two feet into bedrock These core samples will be monitored with a field instrument for the detection of low energy radiation (FIDLER), and in accordance with FO 15 Photoionization Detectors and Flame Ionization Detectors, visually inspected for signs of DNAPL or other contaminant staining, and then visually logged by the field geologist per GT 01 Logging Alluvial and Bedrock Material The depth and thickness of stained or saturated core will be described in detail, however, portions of Procedure GT 01 will not be necessary e g , sieving samples, investigation with a binocular microscope, and field estimates of plasticity

Soil samples will be collected for analyses as described in Table 2 from every geoprobe hole to determine whether VOC source material is present in the subsurface soils Samples collected for laboratory analysis of VOCs will be taken from discrete intervals where there are indications of contaminants, or from immediately above the bedrock surface A minimum of one sample per geoprobe hole will be taken The following hierarchy will be utilized to determine where to sample

1 A sample will be taken from any intervals showing visible staining or the presence of DNAPL If more than one discrete interval shows sign of DNAPL, then a sample will be taken from each interval

2 If visible indications of DNAPL are not present, them the sample will be taken from the interval with highest FID/PID reading

3 If the FID/PID does not detect the presence of solvents, then the sample will be taken from the soil interval directly above top of bedrock

Radiological samples will be collected from the same interval as the VOC sample

3 3 DNAPL/Groundwater Samples

If PID/FID readings, visible staining of the core, or the presence of DNAPL on downhole tools indicate that free product is present, temporary wells will be installed After the geoprobe holes are completed to the required depth, 1/2” to 3/4” internal diameter, Number 10 slotted, Schedule 40 stainless steel screen sufficient to reach from the bedrock surface to one foot above the projected depth of free product will be threaded onto sufficient steel casing to reach 6 inches or more above the ground surface The screened section will have a threaded stainless steel cap on the bottom This assembly will be inserted into the hole to allow for collection of groundwater samples 16/40 filter sand will be poured around the casing to cover at least one foot above the slotted screen Granular bentonite will be poured into the annular space to ground surface to prevent cross contamination A one and one-half foot section of 1 5 inch interior diameter casing will be manually installed around the above ground section of the well and granular bentonite will be poured around the outside of the completed well assembly A slip-over steel cap will be loosely affixed to the top of the well assembly A screw-on steel cap will be attached to the 1 5 inch casing for additional protection

Each temporary well will be checked a day after completion The water/free product level will be measured according to GW 01 Water Level Measurements in Wells and Piezometers, and if sufficient liquid exists for sample collection (estimated as at least one foot of standing liquid), a sample will be collected using the methods specified in GW 06 Groundwater Sampling If the geoprobe hole is dry or contains less than one foot of liquid, a notation will be made in the field notebook Those temporary wells that are dry or contain insufficient water for sampling will be revisited after one week has passed, liquid levels will be measured, and the well will be sampled if possible After measuring the liquid level, the measuring device will be examined to determine whether the liquid was water or free product

Temporary wells that are still dry or contain insufficient liquid for sampling after one week will be visited weekly or until the field project ends If sufficient liquid exists prior to completion of the field project, liquid level measurements will be taken and a sample will be collected All liquid level determinations will be noted in the project logbooks At the end of the field project, these temporary liners will be left capped in case they can be used during or after installation of the collection system

If PID/FID readings remain near background levels, if there is no indication of free liquid, and if the core does not show indications of staining, the geoprobe hole will be abandoned as per GT 05 - Plugging and Abandonment of Boreholes

4 0 DATA MANAGEMENT

A field logbook will be created and maintained for the project by the project manager or their designee in accordance with ER-ADM-05 14 Use of Field Logbooks and Forms The logbook will be used in conjunction with the appropriate field data forms required by the operating procedures (Table 3) governing the field activities occurring during this project It is not necessary to duplicate items recorded on field data forms in the field notebook, but if additional clarification of entries on the forms is required, they should be recorded in the field notebook The field notebook should include time and date information concerning the field activities and a sketch map of actual sample locations Information not specifically required by the field data forms should be recorded in the field notebook

Non-analytical data for this project will be collected, entered, and stored in a secure, controlled, and retrievable environment in accordance with 2-G18-ER-ADM-17 01 Records Capture and Transmittal Analytical data will be stored in the APO records center

Table 3 Applicable Field and Administrative Standard Operating Procedures

Procedure Number	Procedure Title
2-G18-ER-ADM-17 01	Records Capture and Transmittal
2-G32-ER-ADM-08 02	Evaluation of ERM Data for Usability in Final Reports
2-S47-ER-ADM-05 14	Use of Field Logbooks and Forms
5-21000-OPS-FO 3	General Equipment Decontamination
5-21000-OPS-FO 6	Handling of Personal Protective Equipment
5-21000-OPS-FO 7	Handling of Decontaminated Water and Waste Water
5-21000-OPS-FO 10	Receiving, Labeling, and Handling Environmental Material Containers
5-21000-OPS-FO 11	Field Communications
5-21000-OPS-FO 13	Containerization, Preserving, Handling and Shipping of Soil and Water Samples
5-21000-OPS-FO 14	Field Data Management
5-21000-OPS-FO 15	Photoionization Detectors and Flame Ionization Detectors
5-21000-OPS-FO 16	Field Radiological Measurements
5-21000-ER-OPS-GT 01	Logging Alluvial and Bedrock Material
5-21000-ER-OPS-GT 05	Plugging and Abandonment of Boreholes
5-21000-ER-OPS-GT 06	Monitoring Wells and Piezometer Installation
5-21000-ER-OPS-GT 10	Borehole Clearing
5-21000-ER-OPS-GT 39	Push Subsurface Soil Sample
5-21000-ER-OPS-GW 01	Water Level Measurements in Wells and Piezometers
5-21000-ER-OPS-GW 06	Groundwater Sampling

4 1 Project Completion

The results will be compiled into a brief data summary and map The location and analytical data will be entered into the Water Database At the end of the project, all records and field documentation will be turned over to the records center with the exception of analytical data which will be maintained by the APO record center The results of this pre-remedial investigation will be utilized in developing a design for the free product collection system at this location

4 2 Quality Assurance

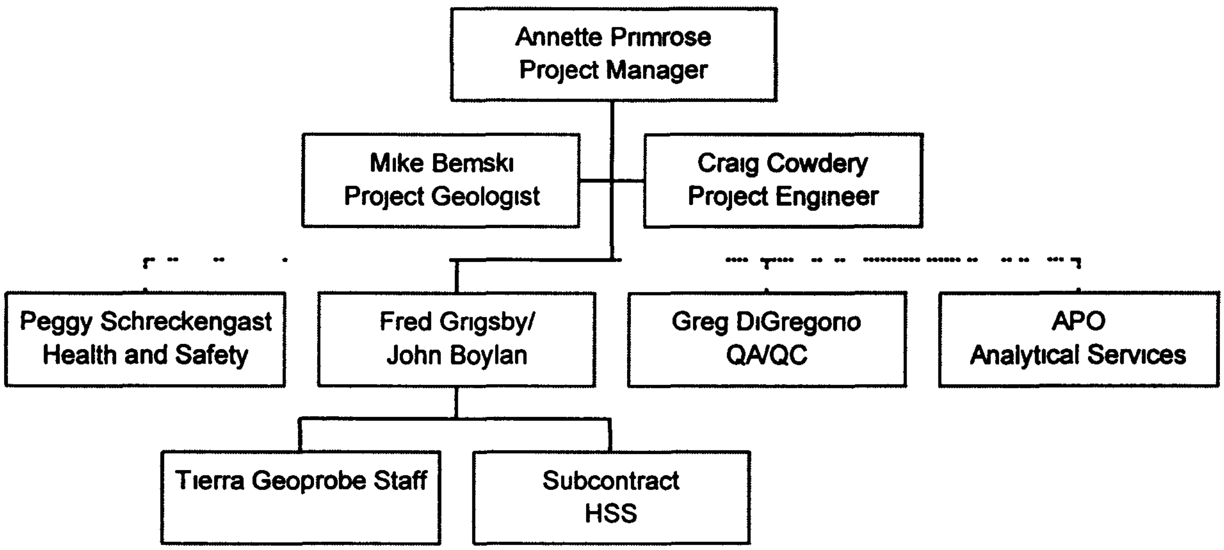
Analytical data collected in support of this investigation will be evaluated using the guidance established by the Rocky Flats Administrative Procedure 2-G32-ER-ADM-08 02 - Evaluation of ERM Data for Usability in Final Reports This procedure establishes the guidelines for evaluating analytical data with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters Typically, for precision, the relative percent difference between samples and duplicates is less than or equal to 40% for soil Accuracy of the laboratories will be obtained by using laboratories as directed by the Analytical Projects Office Comparability will be evaluated by using standardized methods for the collection and analysis of samples Completeness wıll be evaluated by comparıng the proposed samplıng program to the field program as completed A goal of 90% ıs requıred

Data valıdatıon wıll be requıred on 25% of the analytıcal data valıdatıon Data valıdatıon wıll be performed by an ındependent thırd party subcontractor

5 0 PROJECT ORGANIZATION

The project organızatıon chart ıs presented ın Fıgure 3 The ER Projects Group ıs responsıble for management and coordınatıon of resources dedıcated to the project Other organızatıons assıstıng wıth the ımplementatıon of thıs project are RMRS Groundwater, RMRS Health and Safety, and RMRS Qualıty Assurance

Fıgure 3 IHSS 118 1 Project Organızatıon



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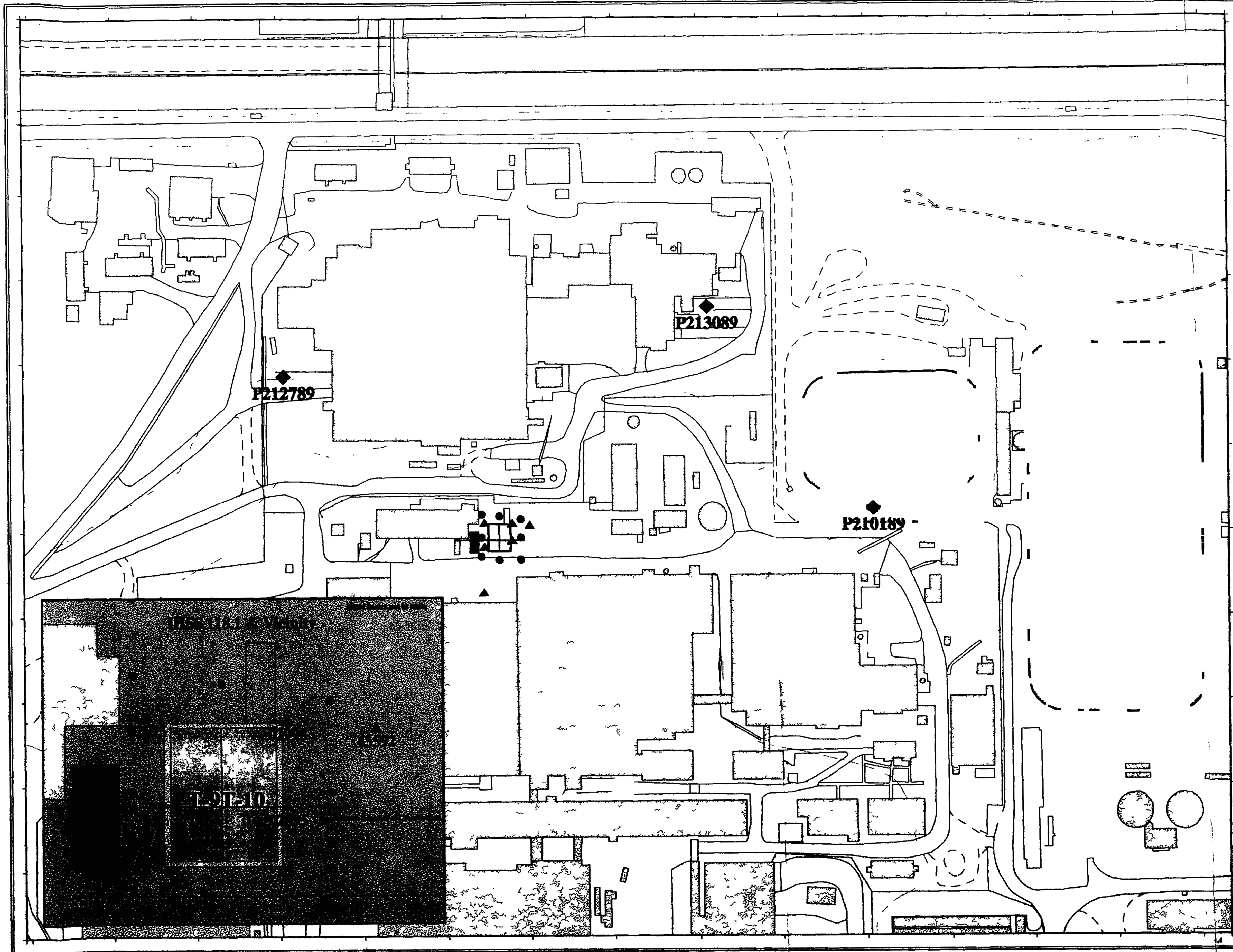
7 0 LIST OF ACRONYMS

APO	Analytıcal Projects Office
DNAPL	Dense Nonaqueous Phase Lıquıd
DOE	Department of Energy
EPA	Envıronmental Protectıon Agency
ER	Envıronmental Restoratıon
FIDLER	Fıeld ınstrument for the detectıon of low energy radıatıon
GPS	Global Posıtıonıng System
IHSS	Indıvıdual Hazardous Substance Sıte
OU	Operable Unıt
PAM	Proposed Actıon Memorandum
PID/FID	Photoıonıztıon detector/flame ıonızatıon detector
QA/QC	Qualıty Assurance/Qualıty Control
QAPD	Qualıty Assurance Program Descrıptıon
RFCA	Rocky Flats Cleanup Agreement
RFEDS	Rocky Flats Envıronmental Database System
RFETS	Rocky Flats Envıronmental Technology Sıte
RMRS	Rocky Mountaın Remedıatıon Servıces
SAP	Samplıng and Analysıs Plan
VOCs	Volatıle organıc compounds



IHSS 118 1
Proposed Borehole Locations

Figure 1

EXPLANATION

- ● Proposed Borehole
- ▲ Existing Borehole
- ● Monitoring Wells

Standard Map Features

- Building or othe struct re
- Solar evaporatio pond
- Lake and ponds
- Streams, ditches, r othe drainage feature
- Fences and other barriers
- Contour (20-Foot)
- Paved roads
- Dirt road

Scale = 1 1680
1 inch represents 140 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum. NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by

RMRS Rocky Mountain Remediation Services, L.L.C.

MAP ID: 97-0180

August 29, 1997